

rain, wells and cisterns dry. Auburn, N. H., 31st, wells and cisterns dry in many localities. Woodstock, Vt., 31st, drought throughout month and still continues without abatement; but two families in the city have sufficient water for household purposes; farmers compelled to haul water for stock from long distances.

High Tides.—San Francisco, 29th, at 10.30 a. m. 6 inches higher than any previous record.

Low Tides.—Newport, R. I., 29th, unusually low, steamer grounded at dock. New London, Conn., 29th, very low, steamship "Massachusetts" went aground in her dock at Stonington; old sailors remark that it is the lowest water for many years.

TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors at Signal Service stations, with the average depth at which observations were taken, is given in the table on the left hand side of chart No. III. Owing to ice and breakage of instruments, observations are wanting as follows: Alpena, Buffalo, Chicago, Cleveland, Detroit, Duluth, Escanaba, Grand Haven, Marquette, Milwaukee, Sandusky and Toledo, from 1st to 31st; Burlington, Vt., 2d to 4th, 6th to 31st; Charleston, 3d to 12th; Delaware Breakwater, 1st to 3d, 11th, 12th, 19th, 21st.

ATMOSPHERIC ELECTRICITY.

Auroras.—Faint auroral displays were observed at St. Vincent, Minn., (the most northerly of Signal Service stations) on the 2nd, 21st, 22nd, 23rd, 24th, 26th and 29th. With these exceptions, no display was observed outside New England or south of the 42nd parallel save that of the 31st. The aurora of the 31st was more than ordinarily brilliant and was observed throughout New England and west of the 92nd meridian to western Montana and north of the 45th parallel. The prevalence of cloud in the entire Lake region and Ohio valley, probably prevented its observation in these regions. The following descriptive notes are of interest: Burlington, Vt., "at 7.35 p. m. a most remarkable auroral display was noted. The dark segment extended 25° above the northern horizon, above which the arch of light was seen, being of a white color, deepening into a pale sea green; a faint rose color was noted in the extreme west-northwest. The principal feature of the display was a white, hazy light, deepening, near the eastern horizon, to a pale straw color, and extending from the eastern horizon to the zenith, and ending in the west-northwest, covering half of the heavens with a white canopy. One or two streamers were observed in the north-northwest. The eastern terminus passed to the south of east, and looked not unlike the light seen when the harvest moon is rising. By 8.15 the display had faded away, and only the dark segment and the arch of light remained. At 9 p. m. the sky was overcast, and only a faint green light was to be seen on the northern horizon. At 11 p. m., with a nearly clear sky, a faint emerald green light was seen on the northern horizon, with several streamers in the north-northwest. At midnight these features were still present." The observer at St. Vincent states that it lasted all night, beginning at 7.30 p. m. of the 30th as a bright streak low down, with a faint arch surmounting it, and increasing in extent and brightness till morning, when it showed magnificent streamers like great brushes, with the dark segment high and pronounced. It was again observable during the entire night of the 31st, though mostly obscured by clouds. The observer at Ft. Missoula reports that it extended over about one-fourth of the horizon with an altitude of 45°. It began at 11 p. m., appeared brightest at midnight and ended at 2 a. m. The sky presented the appearance of a fiery dome, bright and very luminous; flames shooting from nearly every part, similar to those issuing from a burning building. Auroras were also observed in the New England States on the 23rd, 24th, 25th, 26th and 27th, but deserve no special mention.

Atmospheric Electricity Interfering with Telegraphic Communication.—Accompanying the very severe snow-storm of the 6th, which prevailed over a space of about 800 miles in width along the line of the Union Pacific R. R., between Omaha and Ogden, there was experienced a very positive display of electrical disturbance. For 24 hours the telegraph wires were rendered useless, the intensity being shown by the fact that when the telegraph key was opened a steady electric light burned at the connecting points. According to the records kept by the chief operator of the U. P. R. R. telegraph lines there is but one exception in the past 12 years to the regular yearly occurrence of similar storms between the 5th and 7th of January. At Fort Apache, Ariz., on the 16th, wires could not be worked for a considerable time.

Zodiacal Light.—St. Vincent, Minn., 1st, 2nd, 3rd, 6th, 7th, 8th, 21st, 22nd, 24th, 26th, 29th; Little Rock, 25th; Springfield, Ill., 2nd, 17th, 26th, 27th; Nashville, 8th, 25th to 28th; Southington, Conn., 24th; New Corydon, Ind., 1st, 2nd, 11th, 17th; Clinton, Iowa, 26th; Cresco, Iowa, 1st, 17th, 18th; Lawrence, Kan., 1st, 3rd, 12th; Manhattan, Kan., 3rd; Yates Center, Kan., 2nd, 22nd, 24th, 26th, 27th; Somerset, Mass., 16th to 18th, 20th, 22nd to 31st; Cambridge, Mass., 1st, 17th, 18th, 20th, 24th to 29th; Clear Creek, Neb., 1st, 2nd, 3rd, 18th, 25th; Oregon, Mo., 1st, 2nd; Pierce City, Mo., 23rd; Atco, N. J., 19th; Bellefontaine, Ohio, 25th to 28th.

Thunder-storms.—None were reported from the northern sections of the country, and but a small number from the southern districts, as will be seen from the following dates: Florence, Tuc-

son and Fort Apache, Ariz., 16th; Camp Grant, Ariz., 17th; Galveston, 2nd; Clarksville, Tex., 28; Memphis, 19th; New Orleans, 2nd, 18th; Key West, 6th, 7th, 8th, 14th; Wilmington, N. C., 6th, 21st; Charlotte, N. C., 5th; Chincoteague, Va., 6th.

OPTICAL PHENOMENA.

Halos have been observed with considerable frequency throughout the month in the various districts. Solar halos, with mock suns, have been rather numerous, but not of as marked brilliancy and perfection as those reported in December, 1880. The following stations report from 2 to 4 mock suns on the dates named: Fort Stevenson, Dak., 20th; Fort Totten, Dak., 6th, 7th, 8th; Spiceland, Ind., 12th; Pierce City, Mo., 22nd; Cheyenne, 26th; Yankton, 4th, 6th, 11th, 12th, 13th; St. Paul, 4th; Dubuque, 2th; Logansport, Ind., 27th; Bangor, Me., 16th. Nothing of importance was reported in respect to lunar halos, except the following: Clinton, Iowa, very brilliant; four mock moons, and above the body of the halo appeared the inverted arc of a circle. Fort Bennett, Dak., 22nd, 5:20 a. m., very brilliant lunar corona.

Polar Bands.—Prescott, Ariz., 5th; Detroit, 8th; New Corydon, Ind., 2nd, 3rd, 8th, 11th; Glenwood, Iowa, 11th; Yates Center, Kan., 14th, 16th; Gardiner, Me., 11th; Clear Creek, Neb., 11th, 12th; Auburn, N. H., 9th, 20th; Freehold, N. J., 16th; Vineland, N. J., 8th, 12th; Wytheville, Va., 7th, 15th.

Mirage.—Albuquerque, N. M., 8th.

MISCELLANEOUS PHENOMENA.

Meteors.—Punta Rasa, 21st, 10 p. m., quite brilliant; visible about three seconds; course SE. to NW.; disappeared at elevation of about 25° with a long train of incandescent vapor. Springfield, Ill., 1st, 7:48 p. m., large and very brilliant, light sufficient to attract the notice of a person within doors, reading by a coal-oil lamp; was first seen due north at about 25° above the horizon, when it moved downward to a point 47° east and disappeared; motion very slow; no trail or cloud; duration 15 seconds. Cleburne, Tex., 21st, 6:30 p. m., very brilliant. Wytheville, Va., 6th, 6:30 p. m., very brilliant, course S. to N., motion slow until it reached the zenith, when it burst, sending its fragments in every direction, color white; 24th, 8:50 p. m., quite brilliant, rather larger than Mars; started few degrees east of station and moved eastward toward Orion, sinking a little as it passed; no train at disappearance; a few moments later another meteor of splendid bluish-green color, larger than Venus, moved from Cassiopeia towards Saturn, but sunk more rapidly than its predecessor; exploded like a rocket, throwing its fragments in every direction. Woodstock, Vt., 6:45 p. m., quite brilliant; appeared in SW. about 40° above horizon; moved in a northerly direction, leaving a brilliant white train of light visible for about six seconds.

Earthquakes.—*Alaska*: The following graphic description of a remarkable series of shocks occurring in Sitka Alaska in *October* and *November*, 1880, and which lasted for several days, is taken from the report of a special correspondent of an Oregon paper: "October 26th, 6 to 8 a. m., clear with sun shining 9 a. m., cloudy, high wind 10 a. m., tornado 11 20 a. m., cyclone, thunder, lightning, rain and hail; 1:20 p. m., severe shock of earthquake—oscillations from true east to west.

Incidents.—Sudden calm; rumbling; earth wave passed; second, severe upheaval with cracking and splitting noise in and beneath the ground; third, slight shock with apparent return wave. The houses of the town were regularly upheaved in the order in which they stood, showing a true wave. Time from first to third about 18 seconds. Short lull, followed by rain, hail and snow. 2:14 p. m., slight shock with little vibration. 8:46 p. m., two shocks coming from the same direction as the first. 27th, 5:35 a. m., mean time, two short and sharp shocks, direction from magnetic east to west; length of shocks and interval unnoted on account of rapidity of movement; oscillation from north to south and very perceptible, followed by snow, hail, rain and high wind. 9:15 p. m., sharp shock from southwest to northeast. 11:04'. 20" p. m., slight shock, with continued low rumbling for the space of 1 minute and 8 seconds, from east to west. 11.45, same. From 9 to 11, scud flying from southeast to northwest. Stars shining through the break of clouds.

Remarks.—On Thursday, the 28th, there was no perceptible upheaval, nevertheless the phenomena was peculiar during the afternoon of that day or after meridian. I was under the impression that there was a quivering in the air, yet but few persons noticed the state of the atmosphere. Becoming satisfied that something unusual was in the elements, I watched for an effect; could only discover that nervous persons were seemingly very buoyant and restless, while others, particularly females, complained of loss of appetite, accompanied with a feeling of seasickness, and I thought I noticed a feeling akin to hysteria. Under the impression that I must be mistaken, about 6 p. m. I entered a well lighted saloon and there watched for an indication to relieve my doubts or confirm my opinion. Only one person of the whole number, there being about nine in the room, seemed to be affected. That individual, said to be one of the powerful men in the community, addressed himself to me personally several times, asking what I supposed ailed him; declined to answer the question and went to my present home. Retired for the night at 9 o'clock and 30 minutes; the